

REMARKS

Claims 1-9 are pending in the application with claims 1 and 8 being the independent claims. Claim 8 is rewritten in independent form to include all the features of its base claim. Accordingly, the scope of claim 8 is unchanged.

Rejections under 35 U.S.C. § 103

Claims 1-9 stand rejected under 35 U.S.C. § 103 as being unpatentable over FIGs. 4 and 5 of the Specification. Applicants traverse the rejection.

Claims 1-7

Claim 1 is directed to a plasma processing apparatus including a process chamber having an internal space which can be evacuated and a ceiling having an opening. A supporting frame member is placed along the periphery of the ceiling and includes a ring-shaped supporting shelf protruding toward the center of the process chamber. The apparatus also includes an insulating plate with its peripheral portion supported by the supporting shelf, airtightly covering the opening of the ceiling of the process chamber. A mount base is placed in the process chamber for mounting a workpiece to be processed. The apparatus includes a planar antenna member placed above the insulating plate. It includes a microwave radiation hole for transmitting therethrough microwave used for generating plasma, the microwave being transmitted through the insulating plate into the process chamber. A gas supply means supplies a predetermined gas into the process chamber. The supporting shelf has an inner periphery including a corner portion shaped into a curve.

The Examiner relies solely upon FIGs. 4 and 5 of the Specification to assert the rejection, with case law in support. As acknowledged, FIGs. 4 and 5 of the Specification do not teach a corner portion shaped in a curve. See Office Action, page 3. Relying

upon In re Dailey, 357 F.2d 669,149 USPQ 47 (CCPA 1966), the Examiner asserts that it would be obvious to shape the shelf portion to reduce the abnormal discharge.

"If the applicant has demonstrated the criticality of a specific limitation, it would not be appropriate to rely solely on case law as the rationale to support an obviousness rejection." See MPEP § 2144.04. In the present case, the Applicants have demonstrated the criticality of the claimed processing apparatus.

In a conventional processing apparatus, abnormal discharge causes the base aluminum to sputter, thereby introducing the base material into the processing system. Any metal other than aluminum that is contained in the base aluminum material could contaminate the semiconductor wafer W or cause particle generation. See Specification, page 3, lines 4-11.

In contrast, a plasma processing apparatus, having all the features claimed, including a corner portion shaped into a curve, reduces abnormal discharge from occurring and alleviates field concentrations. See Specification, page 3, lines 13-15; page 3, line 32 to page 4, line 3; page 8, lines 21-14; page 9, lines 9-12; page 10, lines 25-30. During a comparison of the claimed plasma processing apparatus to a conventional processing device, the claimed plasma processing apparatus reduced the number of aluminum atoms present on the surface of a processed semiconductor from $1 \times 10^{12}/\text{cm}^2$ to $9 \times 10^9/\text{cm}^2$. This is a reduction of two orders of magnitude. See Specification, page 11, lines 24-32. Furthermore, examination of the conventional processing device revealed traces of the abnormal discharge. In contrast, no trace of the abnormal discharge was found in the claimed plasma processing apparatus. See Specification page 12, lines 2-6. Accordingly, the claimed plasma processing apparatus

has a distinct and significant advantage over the conventional device. This includes alleviating field concentrations and reducing the abnormal discharge, thereby reducing the chance of contamination and reducing the chance of undesired particle generation. Accordingly, a reduction in contaminants and undesired particle generation increases output, consistency, and efficiency. Hence, Applicants have demonstrated the criticality of the specific limitation of rounded corners. Accordingly, a rejection based on case law as a rationale is not proper.

Furthermore, the advantages and improvements offered by the claimed processing apparatus remove the invention from under In re Dailey. The In re Dailey Court held that there was "no [convincing] argument... that the particular configuration of [a] container was significant." In re Dailey, 357 F.2d at 672, 149 USPQ at 50. In the present application, the particular configuration of the plasma processing apparatus is significant. Indeed, the particular configuration of the plasma processing apparatus reduces the abnormal discharge of aluminum atoms by two orders of magnitude, reducing the chance of contamination and undesired particle generation. Accordingly, the logic and reasoning used by the Court in In re Dailey does not apply to the present claimed invention, and does not render it unpatenable. Applicants respectfully request that the Examiner reconsider and withdraw the invention.

Claims 2-7 depend from and add additional features to independent claim 1. Accordingly, these claims are patentable for at least the reasons set forth above. Applicants respectfully request that the Examiner withdraw the rejection and allow these claims.

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Claims 8 and 9

Applicants have rewritten claim 8 in independent form to include all the features of the base claim. Accordingly, the scope of claim 8 is unchanged. Claim 8 is directed to a plasma processing apparatus including a process chamber with an internal space which can be evacuated and a ceiling having an opening. A supporting frame member is placed along the periphery of the ceiling. It includes a ring-shaped supporting shelf protruding toward the center of the process chamber. The apparatus includes an insulating plate having its peripheral portion supported by the supporting shelf. It airtightly covers the opening of the ceiling of the process chamber. A mount base is placed in the process chamber for mounting thereon a workpiece to be processed. A planar antenna member is located above the insulating plate. It includes a microwave radiation hole for transmitting therethrough microwave used for generating plasma. The apparatus also includes a gas supply means for supplying a predetermined gas into the process chamber. The supporting shelf has an inner periphery including a corner portion shaped into a curve. Further, an inner peripheral edge of the supporting shelf is located at a node of microwave propagated in the insulating plate in its radial direction.

Claim 8 is patentable for all the reasons that claim 1 is patentable, as set forth above. Additionally, claim 8 recites additional patentable features. Like claim 1, claim 8 stands rejected using logic from case law and, like claim 1, Applicants have “demonstrated the criticality of a specific limitation.” Therefore, “it would not be appropriate to rely solely on case law as the rationale to support an obviousness rejection.” See MPEP § 2144.04. With respect to claim 8, the Examiner relies upon Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984) to show

that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device, and a device having the claimed relative dimensions would not perform differently than the prior art device, then the claimed device was not patentably distinct from the prior art device.

First, the plasma processing apparatus recited in claim 8 differs from FIGs. 4 and 5 of the Specification by more than just a dimension. As set forth above with respect to claim 1, the prior art does not include all the features of the claimed apparatus, including a corner portion shaped into a curve. This alone renders the reasoning of the Court in Gardner v. TEC systems, Inc. inapplicable to the present application, even if the Examiner relies upon additional case law to argue that the features not in the prior art are obvious.

In addition to all the features of claim 1, claim 8 recites "an inner peripheral edge of said supporting shelf is located at a node of microwave propagated in said insulating plate in its radial direction." Locating the inner peripheral edge of the supporting shelf at a node of microwave propagated in the insulating plate makes the claimed apparatus perform differently than the prior art. Accordingly, the reasoning for the decision in Gardner v. TEC Systems, Inc. does not apply to claim 8. For example, locating the inner peripheral edge of the supporting shelf at a node of microwave propagated in the insulating plate results in a significantly reduced potential difference between the corner portions P3 to P5 and insulating plate 80. This further contributes to prevention of the locally occurring abnormal discharge, thereby preventing sputtering of aluminum from the supporting shelf 106. Accordingly, particle generation and contamination due to any impurities in the metal is reduced. See Specification, page 11, lines 5-15; page 4, lines

25-31; page 9, lines 28-30. Because of this, the processing apparatus recited in claim 8 performs differently than the system shown in FIGs. 4 and 5, and hence, does not fall within the reasoning applied in Gardner v. TEC Systems, Inc. Accordingly, claim 8 is patentable over FIGs. 4 and 5 in the Specification.

Claim 9 depends from and adds additional features to independent claim 8. Accordingly, claim 9 is patentable for at least the reasons that claim 8 is patentable. Applicants respectfully request that the Examiner withdraw the rejection.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully requests withdrawal of the rejection and allowance of the pending claims. Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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